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Science and Technology for Tomorrow's Air and Space Force

Success Story

AIR FORCE BASIC RESEARCH HONORS ANNOUNCED



Dr. Ashwani Vij of the Propulsion Directorate's Space and Missile Propellant Branch at Edwards Research Site was nominated for the Air Force Basic Research Award. The nomination was based on his discovery of the key chemical species N_5^- in the engineering area of polynitrogen chemistry. This is a significant discovery because it has been more than 100 years since the last isolation of a nitrogen species.



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Accomplishment

The office of the Air Force chief scientist made the Basic Research Award selections. Dr. Vij's discovery makes the nitrogen anion the second new polynitrogen species discovered and isolated by directorate researchers in recent years.

The polynitrogen area of chemistry may enable incredibly energetic rocket propellants that exceed the capabilities of existent mono- or bi-propellants. The number of known polynitrogen compounds is very limited and they are typically unstable. Dr. Vij's goal was to identify an all-nitrogen anion to combine with nitrogen cation species that could form a neutral all-nitrogen allotrope with enormous potential. His efforts paid off with the discovery of the N_5^- anion in collaboration with researchers at the University of California at Santa Barbara.

Background

In 1999, Dr. Vij's fellow researcher, Dr. Karl Christe, achieved the directorate's first major breakthrough in polynitrogen chemistry. Dr. Vij joined the research group shortly after that breakthrough. His efforts provided very high yields of pure and thermally stable Christe's N_5^+ cation salts. His studies also validated beyond any doubt the existence of Christe's polynitrogen species. Dr. Vij used unique experimental techniques and physical chemistry to create the new anion and then detected and verified it by using a variation of traditional mass spectroscopy.

Propulsion
Awards and Recognition

Additional information

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